Making Kippers from Local Herring (*Sardinella spp.*) Smoke-Cured in the Torry Kiln

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INTRODUCTION

A kipper is a herring with gut and gills removed, split down its whole length along the back, lightly brined and cold smoked.

Herrings are available all year round in Sierra Leone but the best time to use them for making kippers is during the dry season when they are fattest and feeding very well. They account for over 20% of the total amount of fish landed in the whole country and their distribution and use is widespread in the country. The most common method of processing herring locally is hot smoking to give either a soft, moist and cooked product or a dry, brittle product with a very low moisture content. These are strictly speaking preservative measures for a highly perishable foodstuff.

The process described in this paper is a cure intended to add variety to the types of products that can be obtained from local herring. It is only mildly preservative - the product cannot be kept for more than 24 hours without refrigeration.

THE SOURCE AND QUALITY OF THE RAW MATERIAL

Herrings (*S.aurita* and *S.eba*) are landed mainly by the canoe fishermen along the coast. When landed they are not usually one hundred percent fresh as the fishermen may take

a few hours to return from the fishing grounds. They do not use ice to keep their catch fresh consequently by the time the fish is landed at times it is already deteriorating.

The processor must be very careful to select fish which is of very high quality. Here are some features to look for -

bright red gills,
firm round body,
slight clear slime on the body and gills,
absence of bruising or any damage to the skin, and
fresh fish odour.

WASHING

The herring is a very delicate fish and should be handled carefully. The scales are removed with a scraper and the fish is then washed in clean fresh water before splitting.

SPLITTING

For splitting the herring is laid on its ventral side on a smooth wooden filleting board. The blade of a sharp small kippering knife is inserted in the centre of the dorsal part of the head and a cut made through the skull to the mouth. The knife is re-inserted in the initial cut on the head and a second deep cut is made from head to tail keeping the blade of the knife close to the backbone. The fish is then opened and the gills and gut are removed. The split herring (Fig 1) is washed before brining.

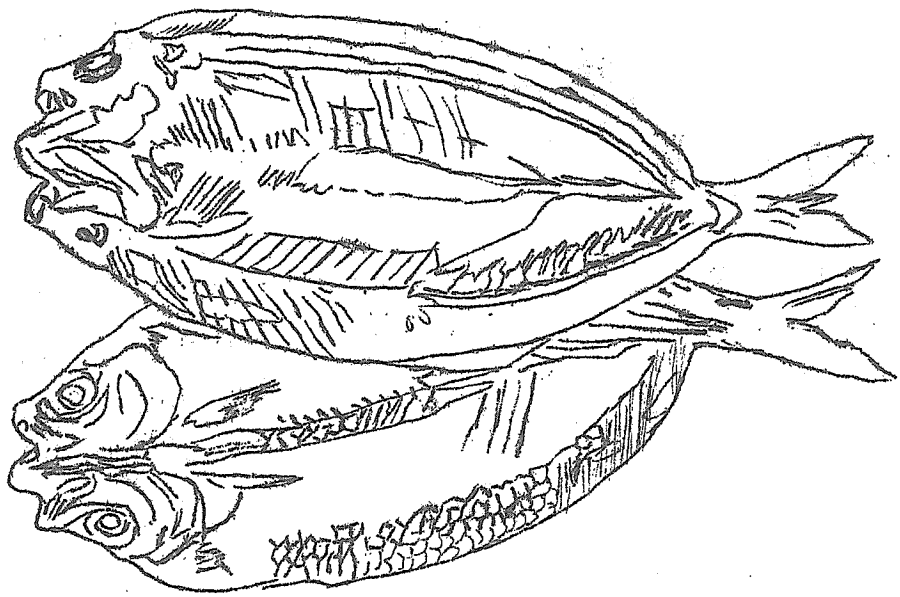

FIG. 1 Split herring.

BRINING

The brining time for kippers depends on the size of the fish and the fat content. Bigger, fatty fish require more time than smaller lean fish.

A 70° - 80° brine (1lb 10 ounces salt/gallon of water) is prepared and the fish is soaked in it for several minutes. Medium sized herrings 10-20cm length require about 15 mins. The brine bath should be stirred several times to even out the brining. Any scum settling on the top should be removed. After the fish has absorbed enough salt it is removed and drained on a wiremesh tray. The brine can be used 2-3 times after which it should be discarded.

SMOKING

The fish can be hung on hooks or spread out on wire gauze trays for smoking. Both methods have their disadvantages. In the hanging method the hooks leave unsightly holes in the fish, and they can be difficult to keep clean. Also during smoking some of the fish tend to fall off the hooks and these cannot be hung again as they become contaminated. The tray method is better because the fish cannot fall off but it has the disadvantage of leaving marks on the skin of the fish if the wire is too thick. Also if the fish is not properly drained a small pool of brine will collect in the cavity which was occupied by the gut to form a white patch when dried.

The average time required for smoking is 3-4 hours in the Torry Kiln at 40°C and 5-6 hours in non-mechanical chimney kilns. There should be a weight loss of about 20% to give a not too dry product.

Smoke from fire wood has two effects:-

(1) the chemical constituents of the smoke are deposited on the surface of the fish to give the characteristic colour and flavour;

(2) acts as a mild preservative. The heat from the fire dries the fish.

THE TORRY FISH SMOKING KILN

The Torry Fish Smoking Kiln is a mechanical smoking kiln designed by the Torry Research Station in Aberdeen, Scotland for smoking fish, etc., under controlled conditions.

Smoke is produced in a special type of insulated furnace and conducted by an electric fan through ducts leading into the kiln. Fresh air can be sucked into the kiln and part of the humid smoky air leaves the kiln through a chimney. Heaters, which are usually electrically operated and thermostatically controlled, are used to maintain the temperature of the smoke circulating in the kiln.

The kiln* is fitted with doors and quick-release catches for easy access to ducts and chambers, so that the whole equipment can be readily cleaned.

* The general principles involved in the operation of the kiln are given in Fisheries Division, Technical Paper No.2. A more detailed description of the Torry Kiln and its operation and maintenance is given in a booklet 'Fish Smoking-Torry Kiln operators handbook', issued by Torry Research Station, and published by Her Majesty's Stationery Office.

SMOKING IN THE TRADITIONAL KILN

Herring is smoked locally in a traditional kiln known as the 'banda'. However, there are several drawbacks in its construction and the desired end product is hard to achieve. The 'banda' is a platform of wire gauze mounted on a drum with both ends cut out over an open fire. The fire is often difficult to control and maintaining a constant temperature is virtually impossible. Moreover a lot of ash can settle on the fish and make an undesirable coating, and the intense heat overcooks the fish.

The banda can be modified to form a covered oven with doors and air vents and a chimney whereby air flow and temperature can be somehow controlled.

Smoking in the modified oven is slower and less efficient than in the mechanical oven and it is impossible to give standard smoking time because a lot depends on outside weather conditions and the smoker's ability to control the fires. However with constant attention an approximate temperature and the right amount of smoke needed can be obtained and the product can be finished in about 5-6 hours as compared to 3-4 hours in the mechanical kiln.

PACKING AND STORAGE

The kippers are allowed to cool at room temperature before they are packed in polythene bags and sealed. Care must be exercised when the product is handled, to avoid damage and contamination.

The kippers can be distributed for sale soon after processing but should be displayed in refrigerated cabinets. The kippers can be kept chilled for 1 to 2 days but for longer storage freezing is advisable. When packing for freezing the kippers should be wrapped in polythene or cellophane wrappers and packed in cardboard boxes and placed in a blast freezer. Frozen kippers can be stored at - 20°C or below for 1-2 months in first class condition.